॥वसुधैव कुटुम्बकम्॥

SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

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Founder: Prof.Dr. S. B. Mujumdar, M.Sc., Ph.D. (Awarded Padma Bhushan and Padma Shri by President of India)

Lab Assignment —9

Aim :

Implement Support Vector Machine for Classification.

PART — A

SVM for Clustering

SVM (Support Vector Machine) is primarily known as a supervised machine learning algorithm used for classification and regression tasks. However, it is not a typical clustering algorithm like K-Means or Hierarchical Clustering. SVM is inherently designed to work in a supervised learning setting where it learns to classify data points into predefined categories based on labeled training examples.

That said, SVM can be adapted for clustering in a couple of different ways:

One-Class SVM:
One-Class SVM is a variant of SVM that can be used for anomaly detection or clustering in a one-class setting. In this approach, you train an SVM to learn a decision boundary that encapsulates the normal data points, effectively defining the "one class." Data points outside this boundary are considered anomalies or outliers. This can be seen as a form of clustering, where you are separating the majority of data points from the minority (anomalies).

Transforming SVM for Clustering:
Another approach is to use SVM for clustering indirectly. You can train an SVM model on the data and then use the distance of each data point from the hyperplane as a measure of similarity or dissimilarity. This similarity measure can be used to group data points into clusters using techniques like hierarchical clustering or DBSCAN.

However, it's important to note that these adaptations are not the most common or straightforward methods for clustering data. Traditional clustering algorithms, such as K-Means, hierarchical clustering, or DBSCAN, are more widely used and designed specifically for clustering tasks. SVM is typically better suited for supervised learning scenarios where you have labeled data.

PART — B

Experiment:

Implement SVM for Clustering.

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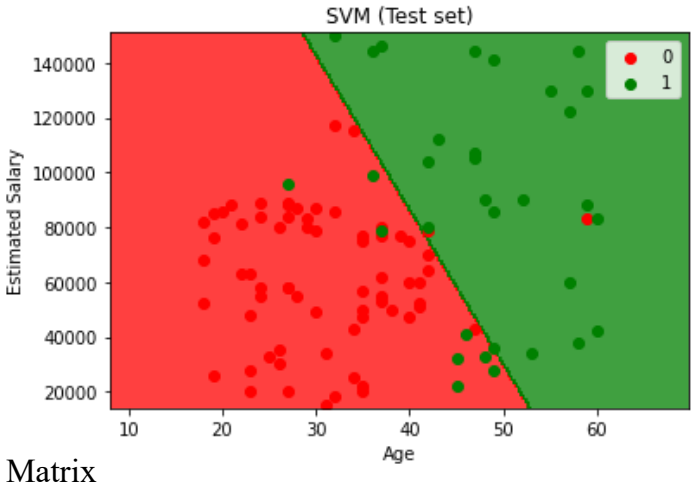
1. Training Set Visualization

2. Test set visualization



3. Confusion Matrix

```
from sklearn.metrics import confusion_matrix, accuracy_score
cm = confusion_matrix(y_test, y_pred)
print(cm)
accuracy_score(y_test, y_pred)
```

```
[[66  2]
 [ 8 24]]
0.9
```

Inference Discussion

We have successfully implemented SVM for Clusteri ng visualizing the train ing set and testing set results paired with the confusion matrix for evaluation.